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Previous research has examined home-based reading practices in families with typically developing children, however, little is known about these activities in families with children with Autism Spectrum Disorders (ASD). This study describes the naturalistic interactions of 11 mothers and their children (7.4–12.9 years of age) during home-based reading. We report on children's reading behaviours and mothers' responses to them, including the provision of print-based information (which emphasises error correction) versus contextual information (which emphasises reading for comprehension). We also investigated mothers' beliefs about the relative importance of these two types of information. Results revealed that mothers ranked the provision of print-based information as being more important than the provision of contextual information. Consistent with this, mothers demonstrated more print-based than contextual behaviours during their child's oral reading. These findings are comparable with those of previous studies that have examined home-based reading between mothers and typically developing children. It is hoped that this research will stimulate awareness amongst educators, clinicians and families of children with ASD about the role that parents play in their children's reading development and encourage additional research.

Introduction

Home-based reading activities, commonly referred to as *shared book reading* (where parents read to their children) and *oral-reading practice* (where children read to their parents), are widely promoted as helpful for children's reading development (Swanson et al., 2011). While parents often engage in reading activities with their children for reasons other than the advancement of literacy (e.g., bonding: Audet, Evans, Williamson, & Reynolds, 2008), there is potential for children's reading skills to be enhanced during interactive book reading. This is a particularly valuable goal for children who have a developmental disability that places them at risk of reading difficulties. Indeed, educators and clinicians often encourage home-based reading activities in children with developmental disabilities. Here we sought to explore the nature of home-based reading activities in families with a child diagnosed with an autism spectrum disorder (ASD). The key aim of the present study was to provide

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naturalistic data describing these parent-child reading interactions. We also sought to investigate the relationship between parental *beliefs* about the importance of particular strategies in learning to read and parents' actual *behaviours* during their child's oral-reading practice activities.

Reading acquisition in children with ASD

The reading level of many individuals with ASD is below the expected range for their age. A study by Mawhood, Howlin and Rutter (2000) reported on 19 participants who were first assessed at 7–8 years of age and then followed-up between 21–26 years of age. At follow-up, the mean reading accuracy level of participants was 12.17 years and the mean reading comprehension level was 10.64 years.

Difficulties have been reported in terms of both accuracy and comprehension but comprehension, in particular, appears to be an area of relative weakness for some children with ASD (Huemer & Mann, 2010; Nation, Clarke, Wright, & Williams, 2006; Ricketts, 2011). Although a discrepancy between levels of accuracy and comprehension has been observed in some typically developing children (Hulme & Snowling, 2011), this pattern appears to be more common in children ASD. Around 6% of children with ASD demonstrate hyperlexia (Calhoon, 2001), where word recognition skills are very advanced in comparison to word comprehension skills (for further discussion see Newman et al., 2007; Saldaña, Carreiras, & Frith, 2009). Certainly, many children with autism experience oral language impairment (Kjelgaard & Tager-Flusberg, 2001) and other deficits associated with cognitive and pragmatic processing (Volden, Coolican, Garon, White, & Bryson, 2008), which may, in turn, have an impact upon their reading development, especially in the area of comprehension (Norbury & Nation, 2011).

There is a lack of research investigating the efficacy of reading interventions for children with ASD (Randi, Newman, & Grigorenko, 2010). Even less is known about the ways in which parents of children with ASD might support the development of their child's decoding and comprehension skills through home reading activities (Chandler-Olcott & Kluth, 2008). Although the home reading environments of children with and without disabilities have been shown to be similar in terms of the types of books that children are exposed to, it seems that levels of engagement with and concentration during home reading activities may differ (Johnson, Bornman, & Alant, 2010; Rashid, Morris, & Sevcik, 2005; see also Butz, Crocetti, Thompson, & Lipkin, 2009). Children with disabilities are less likely to engage in independent book reading for pleasure and are more likely to struggle with concentration during interactive book reading activities. Gaining further insight into parents' interactions with their children and their beliefs about how children learn to read are important steps in identifying ways in which home-based reading might enhance literacy development in children with ASD.

Approaches to learning to read

Over the decades, there has been dynamic academic debate over how to teach reading (e.g., phonics emphasis versus whole-language). Phonemic awareness refers to the ability to hear and manipulate the sounds in words. The combining of this awareness with letter knowledge to create spelling-to-sound mappings that assist in decoding text is the goal of phonics instruction. In the whole-language method of

reading instruction, children are encouraged to take a global approach to solving the problems of decoding and understanding text. This is undertaken through the use of a range of strategies, including recognising whole words, looking for clues in the illustrations and inferring words from the context or from their prior knowledge of the topic (de Lemos, 2005; Harris & Graham, 1996).

The evidence supporting the use of phonics instruction for typically developing children is incontrovertible (Rayner, Foorman, Perfetti, Pesetsky, & Seidenberg, 2001; Rose, 2006). Interestingly, it has been suggested that as many as 50% of children with special needs (i.e., children with an intellectual and/or other developmental disability) may not receive the same level of benefit from phonics-based instruction as their typically developing peers (Al Otaiba & Fuchs, 2002), although there is a much smaller evidence base to draw upon when examining reading acquisition in children with special needs.

Consensus from the research literature (see Department of Education, Science and Training, 2005; National Reading Panel, 2000; Snow, Burns, & Griffin, 1998) provides evidence that promoting the big ideas of reading (e.g., oral language, phonemic awareness, alphabetic principle, automaticity of the code, comprehension) is key to young children learning to read. These elements are visible in contemporary evidence-based programs targeting reading difficulties (e.g., MULTILIT: Ellis, Wheldall, & Beaman, 2007).

Parental beliefs and behaviours during reading

Previous research with families of typically developing children has demonstrated a significant relationship between parental *beliefs* about which approaches are the most effective in teaching children to read and parental *behaviours* during interactive book reading (e.g., DeBaryshe, Binder, & Buell, 2000; Lynch, Anderson, Anderson, & Shapiro, 2006; Weigel, Martin, & Bennett, 2006). It has been demonstrated that parents who subscribe to a whole-language or constructivist view tend to draw their children's attention primarily to the use of background knowledge and semantics (e.g., ''What do you think the clown is doing in this picture?'') as a way of understanding the text (Evans, Fox, Cremaso, & McKinnon, 2004). Conversely, those parents who subscribe to a phonics approach tend to emphasise accurate decoding of print into speech (e.g., ''Let's sound it out … h-o-pp-ing''). Parents' attention to print-based information, such as sound-letter correspondences (in line with a phonics approach), has been shown to advance children's literacy more effectively than when parents emphasise contextual and semantic information (Phillips, Norris, & Anderson, 2008). While there is some evidence for the benefits of print-focused home reading interventions in children with language impairment (Justice, Skibbe, McGinty, Piasta, & Petrill, 2011), investigations of home-based reading interventions with children with ASD represent a conspicuous gap in the literature.

Generally speaking, parental intervention tends to decrease as children become increasingly competent readers (Mansell, Evans, & Hamilton-Hulak, 2005). However, there appears to be variability in the way parents correct their child's reading. For instance, Bergin, Lancy, and Draper (1994) described a high level of parental criticism and a correspondingly high level of child frustration during the oral-reading practice of children who were poor readers, compared to those who were good readers. Similarly, Tracey and Young (2002) found that mothers of below-average readers were significantly more likely to correct their child's reading

errors than mothers of above average readers. Moreover, these reading activities were deemed to include excessive error correction (an average of 16.3 instances of error correction by mothers of below average readers compared to 3.5 by mothers of above average readers), which were characterised by ''frustration and failure for the children and, most likely, for the mothers as well'' (p. 733). Excessive error correction is not conducive to children's reading confidence, enjoyment and motivation to engage in reading activities (Baker, Mackler, Sonnenschein, & Serpell, 2001). Research with teachers showed similar patterns, with poor readers generally receiving less helpful interventions during oral-reading practice (Wheldall, Colmar, Wenban-Smith, Morgan, & Quance, 1992).

The present study

The key aim of the current study was to provide a descriptive account of parent-child interactions during home-based reading in families of children with ASD. As far as we are aware, ours is the first study to do this and, as such, we were open to what we might find. However, we expected that parents might tend to monitor their child's comprehension during reading, because comprehension can be an area of difficulty in children with ASD. Having said that, previously published studies of book reading with typically developing children have suggested that parents tend to focus on reading accuracy during their children's oral reading practice, especially where children are yet to become proficient decoders (Mansell et al., 2005). Thus, it was an open empirical question as to whether parents of children with ASD would provide more print-based information (which emphasises error correction), relative to their provision of contextual information (which emphasises comprehension), during their child's oral reading activities.

As mentioned, previous research has shown that when it comes to home-reading the behaviours of parents of typically developing children are often consistent with beliefs about how children learn to read. There is no particular reason to expect that this would be different in parents of children with ASD. Hence, we hypothesised that there would be a relationship between the reading *beliefs* and the reading *behaviours* of parents of a child with autism, during their oral-reading practice activities. Specifically, we expected that parents who subscribe to a print-based approach would direct their children's attention to print-based information, whereas parents who subscribe to a contextual approach to reading acquisition would direct their children's attention to contextual information.

The adult behaviours reported here include parents' responses to their child's reading errors and responses to what we have referred to here as 'disfluencies' (e.g., hesitations, stuttering, re-reading words or phrases, limited expression), as well as parental behaviours that appeared to be non-contingent. We also report data on child reading behaviours: reading rate, accuracy rate and types and incidence of reading errors and disfluencies. The aim of providing these descriptions of children's reading is to help contextualize the behavioural responses that were provided by parents.

Methods

Participants

A total of 11 children aged 7.4 to 12.9 years ($M = 9.0$ years) and 9 parents aged 38 to 48 years ($M = 42.8$ years) participated in the study (two mothers each had two

children who participated). The invitation to participate was open to mothers and fathers, however only mothers responded.

Mothers. All of the mothers had completed a minimum of 12 years of formal education. Three mothers were engaged in full-time domestic duties, one was in full-time paid employment, four were employed part-time and one was studying. Relative to the mean Australian household income, the average annual income of these families fell between the middle- and high-income groups (Australian Bureau of Statistics, 2011).

Three families reported having between 26 and 100 children's books in their homes, three families reported between 100 and 200 children's books and three families reported having over 200 children's books in their homes. Some seven mothers reported reading to their children every day, while six listened to their children read aloud every day. The remaining mothers read to their children and listened to their children read aloud once or twice a week. Mothers reported that these reading sessions were of less than one hour duration.

Children. The group of children consisted of nine males and two females, all of whom spoke Australian English. All had received a clinical diagnosis previously. Eight of these children had been diagnosed with autism, one had a diagnosis of Asperger's Syndrome and two had a diagnosis of pervasive developmental disorder not otherwise specified. Co-diagnoses for some of these children included apraxia, ($n = 2$), Attention Deficit Hyperactivity Disorder ($n = 1$), stuttering ($n = 1$), auditory processing deficits ($n = 1$) and specific language impairment ($n = 1$).[1] Standardised testing using the Neale Analysis of Reading Ability-3 (Neale, 1999) revealed that five participants were at least 1SD below the population mean for reading accuracy, while one was at least 1SD above the population mean, in terms of age-based percentile rank. Regarding percentile ranks for reading comprehension, six participants were at least 1SD below the population mean, while none were 1SD or more above the population mean. For seven children, reading comprehension was lower than reading accuracy, although a paired samples *t*-test revealed no statistically significant difference between the mean percentile rank of 32.18 ($SE = 9.17$) for reading accuracy and 20.90 ($SE = 8.18$) for reading comprehension ($t[10] = 1.496$, $p = .165$) and the effect size was small ($r = .19$). In view of the sample size we conducted a non-parametric analysis. Similarly, the Wilcoxon signed-rank test revealed no statistically significant difference between the median percentile ranks for reading accuracy and reading comprehension ($z = 1.156$, $p = .248$), although the effect size was medium ($r = .44$).

Materials

Books. The following two books were selected for beginner/easy readers: *Fox in socks* (Dr. Seuss, 1966) and *Put me in the zoo* (Lopshire, 1960). *Zap Zero the delivery man* (Wilmer, 1990) was used as an intermediate reader. *Uncanny* (Jennings, 1984) and *Volcanoes and other natural disasters* (Griffey, 1998) were selected for advanced readers. The children were provided with the appropriate level of books to choose from for the reading session, based on their standardised reading levels (determined by the Neale Analysis of Reading Ability-3).

Literacy Development Questionnaire. Survey items were completed by mothers. These items measured parents' beliefs about the importance of print-based information and practices (e.g., an emphasis on grapho-phonemic clues in text)

compared to contextual information and practices (e.g., an emphasis on gaining clues from illustrations and nearby words and sentences, including the importance of deriving meaning from the text). Additionally, mothers were asked questions to determine their beliefs about the role they play in their children's literacy development. All survey items and questions are listed in the Appendix.

Procedure

Mothers were asked to read as they normally would at home with their child for approximately five minutes. All reading sessions took place in a comfortable, quiet environment of the participants' choosing and were video recorded (using a camera on a tripod). Mothers completed the questionnaire after the book reading.

Parent-child interactions during book reading were independently coded after the session. Three main issues were examined: (1) the child's reading errors and disfluencies, (2) the mother's responses to her child's reading errors and disfluencies and (3) the mother's behaviours independent of the child's reading performance (e.g., praise, attention to knowledge development). Any utterances associated with behaviour management were excluded from the analysis (e.g., "Listen, do you want to go on the computer tonight? Then you have to concentrate and read properly").

Coding of children's reading. Children's oral reading behaviours were coded as either errors or disfluencies.

Children's reading errors were coded using the following categories: morphological error, semantic substitution, omission, insertion and word or sentence shift. Operational definitions of these categories are displayed in Table 1, including examples from the current data.

Children's disfluencies were coded using the following categories: hesitations, false or running starts (for a word and for a sentence), sounding out, repetitions and self-repairs. Operational definitions can be found in Table 2, including examples from the current data.

Coding of mothers' responses to reading errors and disfluencies. Mothers' behaviours were categorised into the type of response and the timing of the response relative to their child's oral reading.

Table 1. Operational definitions for children's reading errors.

Error	Definition
Morphological error	When the child attempts to decode a word unsuccessfully, thus the result spoken is a non-word (e.g., "Trees began bushting into flames" instead of "*bursting* into flames").
Substitution	When the child attempts to decode a word unsuccessfully and the word spoken is a real but incorrect word (e.g., "quiet a day" instead of "*quite* a day").
Omission	When the child misses out a word in text whilst reading fluently or quickly (e.g., "Where [is] the pick-up?")
Insertion	When the child adds a new word to the sentence (e.g., "Waving to all *at* the other delivery men").
Word or sentence shifts	When a common short word is reversed (e.g., 'no' for 'on' and 'was' for 'saw') and when the words are transposed within a sentence.

Table 2. Operational definitions for children's reading disfluencies.

Disfluency	Definition
Hesitation	When the child hesitates, usually briefly (but potentially longer) before a word or sentence.
False start - word	When the child repeats one or more letters at the beginning of a word, sometimes more than once (e.g., ''delivering p-p-p-packages'').
False or Running start - sentence	When the child repeats one or more words at the beginning of a sentence, sometimes more than once.
sounding out	When the child sounds out the individual phonemes or blends in a word as single items. Sounding out may precede accurate synthesis of the word or the child may be unable to synthesise. In the latter case the sounding out becomes an error (e.g., ''S-i-x sick chicks tock'').
Repetition	When the child repeats a single word within a sentence (e.g., ''Please sir, I don't *I don't* . . .'').
Self-repair or Self-correction	When the child makes an initial error, which they spontaneously correct with no verbal or non-verbal intervention from their mother (e.g., ''''It's about time I had a vulcation, *vacation*', says Zap.''

Mothers' responses to their child's error or disfluency were coded in one of three ways. Mothers could (1) *prompt* the child in a range of ways, such as by asking the child to 'try again', by pointing to the target word, or by providing a grapho-phonemic cue (e.g., ''No, it begins with a w'') or a contextual cue (e.g., ''Who's taking him out of the zoo?''), (2) *provide* the word (e.g., ''fussily'') or (3) *ignore* the disfluency or error. The timing of maternal responses was coded as either immediate or delayed, with a lapse of less than two seconds being recorded as immediate, and greater than two seconds being delayed.

Coding of mothers' provision of print-based versus contextual information. Mothers' behaviours were dichotomised into instances where attention was given to print-based versus contextual information. Such behaviours not only included mothers' responses to their child's reading errors and disfluencies, but they also included comments or questions that were unrelated to particular reading errors and disfluencies (e.g., ''Do you know what archaeologists are?'').

Provision of print-based information. Print-based information included any instances where a mother directed her child's attention to the print. For example, mothers might point to the title or authors of the book and encourage their children to read these (e.g., ''But who wrote it?'' [pointing to the author's name]), correct their child's error (e.g., ''choose'', when a child says ''chose''), sound out a word either alone or with their child (e.g., ''st-uck''; ''Ve-su-vi-us'') or provide the beginning sounds in a word (e.g., ''Brrrr . . . '' when a child hesitates over ''brick''). Coding of this category also included instances where a mother pointed to a word to emphasise it, to indicate an error (e.g., a mother pointed to the word 'flame' when her child said 'flam') or to direct the child's attention away from the illustrations and back to the text. However, the few occasions where a mother pointed to every word in the text (to keep the child's place) were excluded.

Provision of contextual information. Contextual information included any instances where a mother directed her child's attention to the illustrations (e.g., ''So what is he [pointing to Zap - the delivery man]? What do you think his

occupation is?'') or made a comment or asked a question (e.g., "So what happened, what's happening to his spots?'') that encouraged her child to consider the meaning of the text (e.g., "You've got the fire-fighters, and who else helped control the fires?'') or that developed her child's knowledge of the topic (e.g., "That's why we have to be careful with the bush''). Additionally, gestures that were not connected with the print were categorised as contextual information. For example, one mother pointed to her tongue when her child hesitated over the word 'tongue'.

Reliability

Inter-rater reliability was established for 15% of the sample (data from two participants). An independent rater was familiarised with the categorisation system using examples from the study. This person then independently categorised the reading behaviours. Reliabilities were calculated using the standard formula of agreements/(agreements + disagreements) x 100. Agreement for errors was 98% and 100%. Inter-rater agreement for coding of children's reading disfluencies was 97% and 99%. Inter-rater agreement for coding of mothers' responses to children's errors was 92% and 96% and to children's disfluencies was 90% and 98%. Lastly, inter-rater agreement for coding of mothers' contextual versus print-based responses to their children's reading behaviours was 90% and 100%.

Results

The average number of words read was 174.73 ($SE = 29.56$) and the average length of reading session was 4 minutes 39 seconds ($SE = 8.10$). Accuracy rates were just under 90%, which confirms that the children were reading texts of an appropriate level. One child obtained a reading accuracy rate of 69.2%, however this child was retained in the analysis so as to demonstrate the individual variability across participants.

Children's errors and disfluencies

Descriptive statistics for children's average error and disfluency rates are shown in Table 3. Children's error and disfluency rates were calculated as the number of errors and the number of disfluencies as a proportion of the total words read. A paired samples *t*-test between proportions showed that the children's mean error rate was significantly higher than their mean disfluency rate ($t[10] = 2.348$, $p = .041$, two-tailed). The effect size was medium ($r = .41$). In view of the sample size, non-parametric analysis was also conducted. Results of a Wilcoxon signed-rank test were consistent with those of the parametric analysis: the children's median error rate ($Mdn = 7$) was significantly higher than their disfluency rate ($Mdn = 4$) ($z = -2.134$, $p = .033$) and the effect size was large ($r = .81$).

Table 3.   Descriptive statistics for children's reading performance.

	Mean	SE	Range
Error rate	10.35	2.42	3.30–30.80
Disfluency rate	5.19	1.05	0.80–10.10

Note: All numbers are percentages.

Reading errors. Descriptive statistics showing the proportion of reading errors in each category are presented in Table 4.

The most common errors produced by the children were substitutions and morphological errors. An average of 44.2% of all reading errors took the form of substitutions (e.g., "I want to go ... " instead of "I want to *see* it"), while 35.9% took the form of morphological errors (e.g., "The koalas sheltired in ecsyilliptus trees", instead of "The koalas *sheltered* in *eucalyptus* trees"). Omissions (e.g., "Fires near the city Melbourne" instead of "Fires near the city *of* Melbourne") and insertions (e.g., "*It* in some parts of southern Australia") followed as the next highest errors, accounting for 11.3% and 5.7% of all reading errors, respectively. Sentence and word shifts occurred infrequently and only accounted for only 2.9% of all reading errors.

Reading disfluencies. Descriptive statistics showing the proportion of reading disfluencies in each category are presented in Table 5.

An average of 37.4% of the disfluencies that children produced were hesitations, while 21.6% took the form of self-repairs (e.g., "First I'll make a quick stack, a *brick* stack"). Repetitions (e.g., "He whizzes across the city waving to all the, *to all the*, delivery men as he goes") and false start words (e.g., "Six st-st-si-sick chicks tock") accounted for 18.4% and 16.4%, respectively. False start sentences (e.g., "Out with, out with you") accounted for only 5.0% of the disfluencies, while only one occasion of sounding out was observed ("First I'll make a quick t-ri-ck").

Mothers' responses to their children's reading behaviours

On average, mothers responded to 55.2% ($SE = 9.8$) of their child's errors compared to 19.9% ($SE = 8.6$) of their child's disfluencies. A paired samples *t*-test

Table 4. Descriptive statistics for children's reading errors.

Error	Mean	SE	Range
Substitutions	4.62	1.55	1–19
Morphological error	3.75	1.17	0–13
Omission	1.18	4.73	0–5
Insertion	0.60	0.19	0–2
Word or sentence shift	0.30	0.18	0–2

Note: All numbers are percentages. The mean value for each category was calculated as the average of the proportion of errors relative to the number of words read.

Table 5. Descriptive statistics of children's disfluencies.

Disfluencies	Mean	SE	Range
Hesitations	1.95	0.67	0–6
Self-repairs	1.13	.45	0–4
Repetitions	0.96	.92	0–2
False starts - word	0.86	0.29	0–3
False starts - sentence	0.26	0.14	0–1
Sounding out	0.06	0.06	0–1

Note. All numbers are percentages. The mean value for each category was calculated as the average of the proportion of disfluencies relative to the number of words read.

revealed that this difference was significant ($t[10] = 2.378$, $p = .039$, two-tailed) and the effect size was medium ($r = .30$). Consistent with this, a non-parametric Wilcoxon signed-rank test showed that mothers responded to significantly more of their child's errors (*Mdn* = 37.5) compared to their child's disfluencies (*Mdn* = 16.7) ($z = -2.223$, $p = .026$) and the effect size was large ($r = .67$).

While many errors were ignored (44.8%), when mothers did respond to errors they supplied the misread word on 30.1% (*SE* = 6.3) of the occasions. Mothers used prompting for 24.8% (*SE* = 7.8) of their children's errors. For example, mothers said "No, I want to … ?" (prompting the word) and "That's *crow*, who comes? *Crow* comes" (providing the word). The majority of mothers' responses to errors were immediate (*M* = 93.3%, *SE* = 3.7) rather than delayed (*M* = 6.7%, *SE* 3.7). Mothers provided error correction at an average rate of 1.7 corrections per minute. For the five children in the current study who were below average readers in terms of accuracy (at least 1SD below the population mean on the standardised reading test), the average rate of mothers' error correction was 1.8 corrections per minute, while the mothers of the average and above average readers corrected errors at a slightly lower average rate of 1.6 corrections per minute.

On average, mothers ignored their children's disfluencies 80.1% (*SE* = 3.3) of the time. In responding to disfluencies, mothers supplied the correct word 6.4% (*SE* = 3.1) of the time and prompted their child on 4.3% (*SE* = 2.0) of occasions. When mothers did respond to their children's disfluencies, 61.9% (*SE* = 16.9) of these were immediate responses, while 38.1% (*SE* = 17.4) were delayed.

Mothers praised their children (e.g., "High five, well done!", "I'm so impressed you know that sound", "Very good reading, lots of hard words") between 0 and 8 times per reading session, at an average of 2.27 times per session.

Maternal provision of print-based versus contextual information

Descriptive statistics showing the proportion of occasions that mothers attended to print-based and contextual information are presented in Table 6.

In the instances where they spoke or gestured during the reading session (excluding instances of praise), mothers were attending to print-based information an average of 74.5% of the time and to contextual information 25.5% of the time. We also examined mothers' responses relative to their number of words read by their children. A comparison of the proportion of mothers' print-based responses (*M* = 12.30, *SE* = 2.96) versus contextual responses (*M* = 4.21, *SE* = 1.65), relative to the total number of words read by their children, also revealed a

Table 6. Descriptive statistics for mothers' attention to print-based versus contextual information.

Attention	Mean	*SE*	Range
Proportion relative to the total number of mothers' responses Print-based information	7.05	1.37	2–18
Contextual information	2.15	0.69	0–7
Proportion relative to the total number of words read Print-based information	12.30	2.96	2–33
Contextual information	4.21	1.65	0–17

Note: All numbers are percentages.

statistically significant difference (t[10] = 3.307, p = .008) and the effect size was large (r = 0.86). Results of a non-parametric Wilcoxon signed-rank test were consistent with the findings of the paired-samples t-test (z = 2.845, p = .004) and the effect size was large (r = .86).

Further analyses revealed that the mothers of the six participants with poor comprehension skills (whose percentile ranks for comprehension were at least 1 *SD* below the population mean on the standardised reading test) attended to print-based information an average of 88% of the time, compared to an average of 64% of the time for mothers of the children with average or above average comprehension ability. A comparison of the proportion of these mothers' print-based responses (M = 10.71%, SE = 3.78) versus contextual responses (M = 1.06%, SE = .534), relative to the total number of words read by the children, using a paired samples t-test, revealed no significant difference (t[5] = 2.366, p = .064), although the effect size was large (r = 0.59). We note that the p value of .064 might be considered to be approaching significance. Results of a non-parametric Wilcoxon signed-rank test revealed a statistically significant difference between the two conditions (z = 2.201, p = .008) and the effect size was large (r = .66).

In terms of questionnaire responses, seven of the nine mothers indicated that they strongly agreed that as parents they have a role in teaching their children about material learned at school, while one mother slightly agreed with this statement and one neither agreed nor disagreed (i.e., neutral). Just over half of the mothers in the sample (n = 6) reported that they were unaware that there is some debate regarding how literacy should be taught in schools. All mothers agreed with the statement that they "play an important role in enhancing [their] child's literacy learning".

Responses to survey items that considered the importance mothers placed on different aspects of reading instruction, and strategies to deal with unfamiliar words, were treated as ordinal data. Low scores indicate that mothers believe the strategies represented by those scale items are unimportant, while a high score indicates they consider the strategies are important. Mothers' scores on the scale measuring *the importance of contextual information in learning to read* ranged from 7–20 (possible range: 3–21), with a median score of 17. Mothers' scores on the scale measuring *the importance of contextual information in dealing with new words* ranged from 7–25 (possible range: 4–28), with a median score of 19. Mothers' scores on the scale measuring *the importance of print-based information in learning to read* ranged from 29–34 (possible range: 5–35), with a median score of 32. Finally, scores on the scale measuring *the importance of print-based information in dealing with new words* ranged from 16–28 (possible range: 7–28), with a median score of 26.

All mothers except one reported higher beliefs for the importance of print-based cues compared to contextual cues in learning to read and recognise new words. Analyses were conducted using non-parametric Wilcoxon signed-rank tests. The importance of print-based information was ranked significantly higher than the importance of contextual information in *learning to read* (z = 2.949, p = .003) and the effect size was large (r = .89). Similarly, the importance of print-based information was ranked higher than the importance of contextual information in *dealing with new words* (z = 2.776, p = .006) and this effect size was also large (r = .84).

The relationship between beliefs and behaviours. All mothers demonstrated at least four instances of print-based behaviours, while all but one demonstrated more instances of print-based than contextual behaviours during their child's oral reading

session. The mother who demonstrated more contextual behaviours nevertheless reported beliefs that were twice as strong for the importance of print-based compared to contextual information in teaching children to read and learn new words. Four mothers did not demonstrate any contextual behaviours during their child's oral reading session.

Discussion

The main aim of this study was to provide a descriptive account of naturalistic home-based reading interactions between mothers and their children with ASD. We did this by documenting children's behaviours during book reading and mothers' responses to these behaviours. In addition, we investigated the relationship between maternal beliefs about how children learn to read and their actual behaviours during book reading. It was an open empirical question as to whether mothers of children with ASD would emphasise print-based feedback or reading for meaning during their child's oral reading. Results showed that mothers drew their children's attention to print-based information more frequently than they did to contextual information. Our results also indicated that mothers were more likely to subscribe to a print-based approach than to a contextual approach in their beliefs about how children learn to read. Mothers in the present study ignored the majority of their children's reading disfluencies and ignored almost as many reading errors as they corrected.

Comparison with previous research

Maternal responses to reading errors and disfluencies. Mothers in the current study corrected significantly more of their children's errors than their disfluencies. This difference is to be expected given that a disfluency, by our definition, results in the successful decoding of the word and consequently requires less intervention than an error. Studies of families of typically developing children have found that parents engage in more error correction during reading when their children are poor readers, compared to when they are good readers. For example, Tracey and Young (2002) found that mothers of below average readers were four times more likely than mothers of above average readers to correct their children's reading errors. No such differences were observed in the current study. Interestingly, the overall error correction rate reported here is slightly lower than that reported in the reading interactions of parents with their typically developing children (e.g., 2.2 corrections per minute: Bergin, Lancy, & Draper, 1994). Tracey and Young (2002) found that college-educated mothers were significantly less likely to engage in error correction activities during their typically developing child's reading than high school educated mothers. Most of the mothers in the current study had completed high school and were either enrolled in or had completed an undergraduate degree or, in two instances, a higher degree, and these characteristics might partly explain the lower error correction rates reported here.

Maternal provision of print-based versus contextual information. On average, the mothers in our study were three times more likely to draw their children's attention to print-based rather than contextual information during reading activities. These overall rates are comparable with those reported for parents of typically developing children. For example, Evans et al. (1998) examined the interactions of 23 parents

and their 23 typically developing children during oral reading practice and found that parents responded with a print-based response to errors around 70% of the time, compared to a contextual response 27% of the time (3% of errors were ignored). Notably, the average proportion of reading errors made by the children in Evans et al.' s study (10.78% of the total words read) is similar to the average proportion of reading errors made by the children in the current study (10.35%), although there was more variability among the latter.

Reading for meaning is a known area of weakness for many children with ASD and just over half of the children we tested were at least 1SD below population norms in terms of reading comprehension on an independent standardised test. Somewhat surprising was the finding that mothers of children with poor reading comprehension provided significantly more print-based information, and less contextual information, than parents of children with average or above average comprehension.

The relationship between mothers' beliefs and behaviours. In the current study, more mothers endorsed print-based rather than contextual approaches to reading instruction. This is consistent with the pattern that has been reported among parents of typically developing children. For example, Evans et al. (2004) surveyed 133 parents to assess their beliefs about the development of children's reading skills and found that 67% of parents endorsed a grapho-phonemic approach, while 23% endorsed a context-driven approach. Similarly, in their survey of parents, Audet et al. (2008) found that 60% of parents subscribed to a print-based approach, while 30% subscribed to a contextual approach.

In the current study, mothers' behaviours during their children's oral reading were consistent with their beliefs regarding reading instruction. This consistency between beliefs and behaviours is in line with the findings of previous studies with families of typically developing children (e.g., Evans et al., 1998; Lynch et al., 2006).

Future research

Although additional research using a larger sample size is needed, the naturalistic data we report here provides a valuable first step in the consideration of home-based reading instruction programs for parents of children with ASD. For example, the finding that children tend to make more errors than disfluencies is helpful in terms of educating parents about what to expect during home-based reading. Similarly, our data show that there is a link between mothers' beliefs about reading development and their behaviours during home-based reading with their children, thus it may be valuable to probe parental beliefs prior to embarking upon a parent instruction program. Our snapshot of the type and frequency of interactions that take place during home-based reading in these families allows researchers to anticipate and further analyse the factors that need to be taken into account when designing intervention studies (e.g., regarding the kinds of parental feedback that are likely to help/hinder children's reading development). Of particular relevance here, it is known that reading comprehension can be an area of relative weakness for some children with ASD. As such, it would be beneficial to look at parents' monitoring of comprehension during home-based reading. Our data suggest that this kind of parental guidance may be lacking, especially in children with ASD who have below average reading comprehension.

Empirical studies are needed to determine whether the type of parental reading instruction that is provided to children with ASD (e.g., print-based versus contextual versus a combination of these approaches) does actually affect children's reading accuracy and/or comprehension at different developmental stages. A recent meta-analysis of 15 studies examined the effects of shared reading on *oral language* outcomes in *typically developing* children (Schickedanz & McGee, 2010), however we are not aware of any research that has examined the effects of different home-reading practices on *literacy* outcomes in *children with ASD*. Intervention studies that investigate longer-term literacy outcomes, in particular, would be valuable.

Conclusion

The present study represents a first step in understanding the ways in which parents engage with their children during home-based reading activities in families affected by ASD. Our findings indicate that during home-based reading, mothers of children with ASD emphasise print-based information more often than they do contextual information and that their beliefs about the importance of providing these types of information are consistent with these behaviours. These findings are in line with previous studies that have examined book reading between parents and their typically developing children. It is hoped that this study will stimulate awareness amongst educators, clinicians and families of children with ASD about the role that parents of children with ASD can play in their children's reading development. Additional research designed to assess the effectiveness of different types of parental instruction during home-based reading with children would be valuable.

Note

1. The data reported here are a subset of data collected as part of a larger study that examined reading ability in children with ASD. We invited all participants to take part in this shared book reading research and all the families who replied saying they wanted to take part were included.

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Appendix

Table A1. Survey items grouped by contextual versus print-based focus.

Survey question	Items
"Please rate how important the following methods are in helping teach children to read"	<u>Contextual information</u> a. Encouraging the child to have the confidence to guess at printed words, using a variety of cues. b. Teaching the child that reading and spelling are for communicating meaning and that small spelling mistakes or pronunciation errors are not important so long as the meaning is clear. c. Accepting the child's attempts at writing/spelling as meaningful, even if they are incorrect. <u>Print-based information</u> a. Teaching the child to sound out letters and groups of letters. b. Teaching the child to sound out whole words on their own. c. Ensuring the child is able to read aloud most/all words accurately. d. Teaching the child to write letters and spell words correctly. e. Teaching the child rules about how changing letter combinations alters the sound (e.g., adding the letter E to the word HOP to make HOPE).
"What do you believe are the best ways for children to deal with unfamiliar words?"	<u>Contextual information</u> a. Skip new word and read the rest of the sentence then go back and try to read the new word again. b. Use the meaning of the whole passage to read the new word. c. Use general world/topic knowledge to read the word. d. Use picture clues in the storybook to read the new word. <u>Print-based information</u> a. Sound out letter/groups of letters to read the new word. b. Divide new words into parts/syllables. c. When a child is stuck on a new word, pausing to allow the child an opportunity to try and sound out the new word independently. d. Encouraging a child to self-correct when they are aware that they have made an error in sounding out a new word.

Note. Possible responses to each question range from a rating of '1' indicating ã unimportantã to '7' indicating 'important'

Table A2. Survey questions.

Question	Response type
Are you aware that there is a debate about how reading should be taught in schools?	Yes/no
As a parent, I have a role to play in teaching my child about material learned in school.	Ratings from '1' indicating 'strongly agree' to '5' indicating 'strongly disagree'
I feel that I play an important role in enhancing my child's literacy learning.	Yes/no/unsure